

CLAIMS

What is claimed is:

1. A method for depositing atoms of at least one first metal onto at least one surface of a substrate of a second metal, comprising the steps of:
 - cleaning said at least one surface for receiving the deposition;
 - dissolving a salt of each at least one first metal into a solvent to provide a solution containing dissolved ions of each at least one first metal;
 - providing a coated surface on the substrate by the steps of applying a layer of the metal-ion-containing solution to the surface and removing the solvent; and
 - thermally reducing the metal ions of each at least one first metal by heating the substrate in a reducing atmosphere at a temperature greater than ambient for a time sufficient to deposit the atoms of each at least one first metal onto the coated surface of the substrate and cooling the substrate before removing the substrate from the reducing atmosphere.
2. The method of claim 1, wherein the reducing atmosphere comprises 5% hydrogen and 95% nitrogen.
3. The method of claim 1, wherein the thermal reduction step is conducted at a temperature of at least 400° C.
4. The method of claim 1, wherein the thermal reduction step is conducted at a temperature below the melting point of the second metal.
5. The method of claim 1, wherein the solvent is water.
6. The method of claim 1, wherein the solvent is an organic liquid.
7. The method of claim 6, wherein the solvent is methanol.
8. The method of claim 5, wherein the salt of each at least one first metal is soluble in water.

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9. The method of claim 6, wherein the salt of each at least one first metal is soluble in the organic liquid.
10. The method of claim 8 or 9, wherein the salt has anions that are selected from the group comprising oxygen, hydrogen, nitrogen, carbon and combinations thereof.
11. The method of claim 10, wherein the salt of each at least one first metal is selected from the group consisting of hydroxides, oxides, oxalates, carbonates, bicarbonates, citrates, cyanides, formates, acetates, nitrates and nitrites.
12. The method of claim 1, wherein the second metal substrate is formed into a useful article before the coating step and the thermal reduction step accomplishes a heat-treating step that is otherwise required for the useful article.
13. The method of claim 1, wherein the second metal is a stainless steel.
14. The method of claim 13, wherein the at least one first metal is selected from a group consisting of nickel, cobalt and combinations thereof.
15. The method of claim 1, wherein the at least one first metal is selected from a group consisting of chromium, molybdenum, tungsten, vanadium, niobium, tantalum, titanium, zirconium, boron, aluminum, gallium, silicon, germanium and phosphorus.
16. A steel strip produced by the method of claim 14, wherein the steel strip displays a measured resistance of less than about 1.5 ohms after aging in an oven at 71 °C for 28 days according to a cathode cup test.
17. A battery can produced from the steel strip of claim 16.
18. A battery can produced by the method of claim 12, wherein the second metal is a stainless steel and the at least one first metal is selected from the group consisting of nickel, cobalt and combinations thereof, and wherein the battery can displays a measured resistance of less than about 1.5 ohms after aging in an oven at 71 °C for 28 days according to a cathode cup test.

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19. An alkaline cell comprising a battery can of claim 17 or 18.

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